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REPORT OF THE OPERATIONS OF THE OIL AND GAS CONSERVATION BOARD

1970

ENERGY RESOURCES CONSERVATION BOARD
603 SIXTH AVENUE SOUTH WEST • CALGARY 1, ALBERTA, CANADA

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PREFACE

This report is the eighth edition of an annual report on the operations of the Oil and Gas Conservation Board. It is introduced with a brief discussion of the general activities of the oil and gas industry in 1970, emphasis being placed on those related to conservation. Following this is a summary of the constitution, responsibilities and functions of the Board; a discussion of its organization and staff; and a general summary of important statutory changes affecting the Board. The main section of the report deals with the responsibilities, organization and activities of the several departments of the Board and discusses the role of each in the discharge of the overall responsibilities of the Board. There is a statement of Board expenditures and revenues, comparing them with previous years and with indices of industry and Board activity. Finally, the addresses and publications of the Board and its staff for 1970 are tabulated.

At the 1971 Spring Session of the Provincial Legislature, the responsibilities of the Oil and Gas Conservation Board were extended to include similar responsibilities for coal and hydro electric, and the Board's name was changed to the Energy Resources Conservation Board to reflect its broader function.

CONTENTS

Preface

I The Alberta Oil and Gas Industry in 1970 1

II Responsibilities and Functions of the Board 12

III Organization and Staff 16

IV Legislative Changes 19

V Duties, Organization and Major Activities of Board Departments 22

- A Development Department 24
- B Oil Department 32
- C Gas Department 43
- D Geology Department 52
- E Data Processing Department 56
- F Economics Department 61
- G Accounting Department 64
- H Office Services Department 71
- I Personnel Department 72

VI Expenditure and Revenue 75

VII Publications and Addresses 81

Chart of Board Organization Inside Back Cover

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I THE ALBERTA OIL AND GAS INDUSTRY IN 1970

Exploration

There were no major oil or gas field discoveries during 1970, with the possible exception of the Fairview area of north-western Alberta where gas reserves of possible major significance were discovered and partly developed during the year. Measured in terms of the 1023 exploratory wells drilled during 1970, the level of exploratory activity was virtually unchanged from 1969. However, exploratory footage, which totalled 4,463 thousand feet in 1970, was down by more than eight per cent from the 1969 level, and the average depth of exploratory wells dropped to 4,360 feet from 4,700 feet in the previous year. A reduced degree of success was achieved in 1970, the proportion of successful exploratory wells being 26 per cent compared to 28 per cent in 1969.

Development

The total number of development wells drilled declined marginally from 837 wells in 1969 to 824 wells during 1970. Successful oil wells drilled declined by 23 per cent from 315 in 1969 to 243 in 1970, whereas the number of successful gas wells was substantially higher: 399 as compared to 291. Development footage drilled declined by 12 per cent during 1970 to 3,417 thousand feet, as compared to 3,873 thousand feet drilled in 1969. The average well depth decreased from 4,630 feet in 1969 to 4,150 feet in 1970.

During 1970, development drilling for oil was concentrated mainly in the Kaybob South, Boundary Lake, Meekwap and Cherhill fields. Most of the development drilling for gas occurred in the Alderson, Brazeau River, Fairview, Medicine Hat, Ricinus, Ricinus West and Strachan areas.

Reserves

Initial recoverable crude oil reserves increased by 232 million barrels during 1970, to reach a total of 10,915 million barrels by the end of the year. The growth in initial recoverable reserves during 1970 was well below the long term average of about 450 million barrels per year and was also less than production during 1970, which totalled 326 million barrels. As a result, remaining recoverable reserves of crude oil fell by 94 million barrels and were 7,602 million barrels as at December 31, 1970.

The modest growth in initial recoverable oil reserves reflects in part the fact that there were no major discoveries in 1970. Enhanced recovery operations were the most important factor contributing to the growth in 1970 and, in total, were responsible for adding some 290 million barrels to initial recoverable reserves. In the absence of these operations, the Province's initial recoverable oil reserves would have been some 60 million barrels lower than at the end of 1969. Significant additions in primary reserves (i.e. about 10 million STB) occurred in each of Kaybob South Triassic A, Boundary Lake Triassic E, Meekwap D-2 A and Cherhill Banff A Pools.

Initial marketable gas reserves increased by about 1.6 trillion cubic feet, reaching a total of 56.5 trillion cubic feet as at December 31, 1970. The relatively small increase in initial reserves was almost entirely due to reassessment and development drilling. New gas discoveries accounted for only 0.3 trillion cubic feet. Production of marketable gas in 1970 was some 1.4 trillion cubic feet; hence, remaining marketable gas reserves increased by only some 0.2 trillion cubic feet to 45.4 trillion cubic feet as at December 31, 1970.

Remaining reserves of propane at year end 1970 were some 649 million barrels, a decrease of 53 million barrels over 1969, while remaining reserves of butanes decreased by some 21 million barrels to a level of 419 million barrels over the same period. Remaining reserves of pentanes plus, on the other hand, increased by some 92 million barrels in 1970 to a level of 1,140 million barrels at December 31, 1970. Thus, total remaining reserves of natural gas liquids increased by some 18 million barrels to 2,208 million barrels as at the end of 1970. The increase in pentanes plus reserves was mainly attributable to reassessment of existing gas reserves and the growth of gas reserves in the Kaybob South and Strachan-Ricinus areas. The decrease in propane and butanes reserves resulted mainly from a re-evaluation of the reserves associated with the reprocessing of natural gas.

Remaining reserves of sulphur increased to some 186 million long tons, a rise of 21 million long tons over the

1969 level. These volumes do not include the sulphur expected to be recovered by the processing of oil sands.

Crude Oil Productive Capacity

An assessment of the Province's conventional crude oil productive capacity at the end of 1970 was published by the Board in its Annual Reserves Report, OGCB 71-18*. The year-end estimates of each category are summarized below.

(1) Peak Value of Maximum Efficient Reservoir Capacity: some 2.29 million barrels per day, as compared to 2.28 million barrels per day at December 31, 1969.

(2) Developed Well Head Capacity: some 1.64 million barrels per day, as compared to 1.59 million barrels per day at December 31, 1969.

(3) Developed Capacity Adjusted for Field and Processing Facility Limitations: some 1.21 million barrels per day, as compared to 1.07 million barrels per day at December 31, 1969.

(4) Developed Capacity Adjusted for Pipe Line System Limitations: some 1.20 million barrels per day, as compared to 1.01 million barrels per day at December 31, 1969.

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* Reserves of Crude Oil, Gas, Natural Gas Liquids and Sulphur, Province of Alberta. December 31, 1970.

The Board applies a reduction of five per cent to the Developed Capacity Adjusted for Pipe Line System Limitations in order to calculate the Province's conventional crude oil Operational Capacity which was estimated at some 1.14 million barrels per day for December 31, 1970, an increase of approximately 20 per cent over the estimate at the end of 1969. The total availability of all types of Alberta oil, including pentanes plus and synthetic crude oil was estimated at 1.31 million barrels per day as of December 31, 1970.

Production and Markets

In 1970, average daily production of conventional crude oil rose substantially by 127,000 barrels to 892,000 barrels, an increase of almost 17 per cent over 1969. The Great Canadian Oil Sands plant production of synthetic crude oil averaged some 33,000 barrels per day, compared to 28,000 barrels per day in 1969. Pentanes plus production recorded an increase of some 15 per cent to average 117,000 barrels per day in 1970, as compared to 102,000 barrels per day in 1969.

Export demand absorbed most of the increase in production of all types of Alberta oil. Alberta exported to the United States some 561,000 barrels per day of oil during 1970, an increase of 100,000 barrels per day, or some 22 per cent over the 1969 average. Exports of Alberta oil reached much higher levels in January and February, averaging 653,000 barrels per day. Over the remainder of the year, exports were affected by the fact that the United States imposed restrictions on the volumes of Canadian oil entering states east of the Rockies. The formal restrictions, which were put into effect in March, were changed later in the year to permit some increase in the flow of Canadian oil to this area.

Demand in Canada for Alberta oil amounted to 476,000 barrels per day in 1970, an increase of some 10 per cent over the 1969 level of 434,000 barrels per day. Alberta's share of the total requirements for Canadian oil west of the Ottawa Valley increased from 64 per cent in 1969 to 68 per cent in 1970. Demand for Alberta oil within Alberta amounted to 111,000 barrels per day, close to the 1969 average.

Gross production of raw natural gas, net of the amounts returned to formation, increased by 265 billion cubic feet during 1970 to reach a total of 1,941 billion cubic feet, a rise of some 16 per cent. Alberta's marketable gas production was 1,478 billion cubic feet as compared to 1,271 billion cubic feet in 1969, an increase of almost 16 per cent. Canadian markets for Alberta gas rose by some 110 billion cubic feet to 793 billion cubic feet, of which some 241 billion cubic feet were consumed within Alberta. Exports to the United States increased by a similar amount to reach 623 billion cubic feet during 1970. The remainder of the marketable gas production was accounted for by the requirements of gas reprocessing plants within Alberta, fuel and losses of pipe lines both within and outside the Province and storage operations.

Substantial growth was again recorded in the production of propane and butanes in 1970. Production of propane rose by some 20 per cent from 46,000 barrels per day in 1969 to 55,000 barrels per day in 1970; production of butanes averaged 34,000 barrels per day, as compared to 29,000 barrels per day in 1969, an increase of some 17 per cent. These increases are a reflection of the rise in natural gas production and also of more extensive gas processing and recovery due to new plants and expansion of existing gas plants. Shipments of Alberta propane to the United States in 1970 were almost double the 1969 levels, in contrast to Canadian and offshore deliveries which remained essentially unchanged. Domestic sales of butanes increased by 38 per cent; export sales by some 26 per cent.

Production of sulphur increased substantially in 1970, rising to 4,182,000 long tons from 3,654,000 long tons in 1969, an increase of some 14 per cent. The additional production, a somewhat smaller increase than in the previous year, was attributable to the growth in natural gas production and the installation of new or enlarged extraction facilities at several existing plants. Shipments of sulphur to Canadian and United States markets increased by some 8 per cent from the 1969 level of 1,403,000 long tons to 1,514,000 long tons in 1970. Offshore shipments rose by 34 per cent from 1,165,000 long tons in 1969 to 1,557,288 long tons in 1970. In total, production of sulphur exceeded deliveries by 1,110,000 long tons. The resulting addition to inventories was approximately the same as in 1969.

Conservation Activity

Developments in Oil

As a result of increases in demand, attention was focussed on the Province's current and future crude oil productive capacity, as well as the capacities of extraprovincial pipe lines. Based on information submitted at the annual reserves hearing, the Board publishes each year a summary of capacities within the Province. During 1970 the Board supplemented these estimates with an interim appraisal of capacity which was circulated to industry in October.

The development of more effective enhanced recovery techniques for application in oil pools in Alberta is an important element in the growth of the Province's reserves. Thirty-three applications for new enhanced recovery schemes were considered during 1970. Probably the most significant new scheme was the solvent flood integrated scheme in the Zama-Virgo area. In the Rainbow area, solvent flooding was extended to two more pools. The Board staff undertook further work to foster the co-ordination of enhanced recovery schemes among operators in the Zama area.

Although activity in oil sands development and experimental schemes was relatively quiet in 1970, renewed interest appeared to be developing at year end.

Developments in Gas and Propane

In January, 1970, the Board reported on the 1969 application of Alberta and Southern Gas Co. Ltd. in OGCB 70-A*. As a result of the Board's recommendations, a permit was issued to Alberta and Southern authorizing the removal of an additional 578 billion cubic feet of gas from the Province. During 1970, the Board heard further applications relating to gas removal permits by Trans-Canada Pipe Lines Limited, Consolidated Natural Gas Limited and Alberta and Southern Gas Co. Ltd. The Board reported on the Trans-Canada application in OGCB Report 70-B** and, with the approval of the Lieutenant Governor in Council, issued a permit to Trans-Canada authorizing the removal of an additional 960 billion cubic feet of gas from the Province. The report on the applications by Consolidated and Alberta and Southern was being completed at year end.

The Board held the first of a series of hearings on Alberta's future gas requirements and, at year end, the report on this hearing was being prepared.

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* In the Matter of an Application of Alberta and Southern Gas Co. Ltd. under The Gas Resources Preservation Act, 1956. January, 1970.

** In the Matter of an Application of Trans-Canada Pipe Lines Limited under The Gas Resources Preservation Act, 1956. 1970.

The Board also considered an application from Dome Petroleum Limited and TransCanada GasProducts Ltd. for removal of propane from the Province. Following publication of OGCB Report 70-C*, a permit was issued authorizing the removal of an additional 8 million barrels of propane from the Province.

Gas conservation projects were initiated in the Mitsue and Twining North fields and extended in the Swan Hills, Pembina, Ferrier and Willesden Green fields.

New gas processing plants were approved by the Board for the Bigoray, Gilby, Lone Pine Creek, Medicine River, Parflesh, Plain, Provost, Rainbow South, Sedgewick, Strachan-Ricinus West, Swalwell, Swan Hills, Virginia Hills and Zama areas. Expansions to 17 previously approved plants were also authorized, including a 0.5 billion cubic foot per day expansion in the approved capacity of the Empress Plant to be operated by Dome Petroleum Limited for the reprocessing of gas removed from the Province.

Government Revenue

Total Government revenue from oil and gas mineral rights decreased from a record $277 million in 1969 to some $218 million in 1970. The 1970 revenue was the lowest recorded during the last six years. The 1970 total reflects rental payments of $56 million, a decrease of $5 million from 1969; royalty payments of $136 million, an increase of

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* In the Matter of an Application for Reconsideration of a Permit Authorizing the Removal of Propane from the Province of Dome Petroleum Limited and TransCanada GasProducts Ltd. under The Gas Resources Preservation Act, 1956. November, 1970.

$23 million; and revenue from Crown Reserve sales of $26 million, a drop of $76 million.

Industry Revenue

Revenue to the oil and gas industry from sales during 1970 totalled $1,304 million, an increase of some 15 per cent over the 1969 level of $1,131 million. Sales of crude oil and pentanes plus continued to yield the largest revenue and rose by some 18 per cent from $838 million in 1969 to $991 million in 1970. In proportionate terms, this increase is slightly higher than the increase in the volume of production and reflects an increase in the average price of crude oil and equivalent at the end of 1970. Posted price increases of approximately 25 cents per barrel were announced by all companies in December, following a similar increase in the United States in November. Revenue from sulphur decreased from $59 million in 1969 to $27 million in 1970. This 54 per cent decrease, compared to an increase of some 20 per cent in the volume of sales, resulted from a sharp decline in the average selling price of sulphur. The total revenue from sales of gas, propane and butanes rose by some 22 per cent, with gas revenue amounting to $244 million, a 22 per cent rise, propane totalling $26 million, 25 per cent higher than in 1969, and butanes totalling $15 million, some 16 per cent higher than in 1969. Increases occurred in the average prices of gas and propane during 1970.

II RESPONSIBILITIES AND FUNCTIONS OF THE BOARD

The Board is established by The Oil and Gas Conservation Act, 1969 for the purpose of administering that Act. It is also charged with the administration of The Gas Resources Preservation Act, 1956, and The Turner Valley Unit Operations Act. Additionally, it may be called upon to supply information and advice to the Department of Mines and Minerals, particularly in connection with applications for permits under The Pipe Line Act, 1958, and with certain types of technical matters dealt with under The Mines and Minerals Act. Finally, the Board, like the Public Utilities Board, may refer applications that touch on matters in part within the purview of each of the Boards to the Gas Utilities Board, of which the Chairman of the Oil and Gas Conservation Board is a member and to which the Board gives technical and other assistance in connection with applications referred by it.

The purposes of The Oil and Gas Conservation Act, 1969, are: (1) to effect the conservation of and prevent the waste of the Province's resources in oil, gas and crude bitumen (the hydrocarbon bearing mixture extracted from oil sands); (2) to secure the observance of safe and efficient field practices; (3) to afford each owner of oil and gas the opportunity of obtaining his share of production of any pool; (4) to provide for the recording and dissemination of information regarding oil, gas and crude bitumen resources of Alberta; and (5) to control pollution above, at or below the surface in oil, gas and crude bitumen field operations and other operations over which the Board has jurisdiction. The Board must see that, in the light of sound engineering and economic principles, oil and gas field operations are so conducted that wells are properly located, spaced, drilled, equipped and produced so that the recovery of oil or gas from a pool is not lessened and reservoir energy is not improperly dissipated, that enhanced recovery techniques are used where suitable, that waste of gas is minimized, that proper storage facilities are used, and that oil or gas is not produced in excess of demand or of storage and transportation facilities. The Board is required to see that oil and gas field operations are so conducted that pollution to the atmosphere, the surface or underground formations containing water, oil or gas, is controlled.

Under The Oil and Gas Conservation Act, 1969, the Board also is charged with the examination of schemes, either of an experimental or commercial character, for obtaining production from oil sands. In this the Board is concerned with the conservation and prevention of waste of these resources, the control of pollution, and orderly development of oil sands so that the production will supplement but not displace conventional oil.

To carry out these functions the Board employs appropriate personnel, including engineers, geologists and others. It maintains a head office in Calgary and area offices serving major oil and gas regions. The Board issues regulations and orders pertaining to drilling and producing operations; considers applications by operators; has its staff conduct inspections and make studies; conducts investigations, holds hearings and prepares reports; and collects, summarizes, evaluates and publishes various data.

The Board also, under Part 11 of The Oil and Gas Conservation Act, 1969, assesses and taxes oil and gas properties to obtain a revenue to cover one-half of its expenses under the Act.

The Turner Valley Unit Operations Act empowers the Board, upon application, to order a part of the Turner Valley Rundle Pool to be operated as a unit. Under this Act, four oil productive and one gas productive units have been established encompassing substantially all of the Turner Valley Field.

The purpose of The Gas Resources Preservation Act, 1956, is to provide for the effective utilization of the gas resources of the Province, having regard to the present and future needs of persons within the Province. For this purpose, the Board must from time to time determine the volumes of established reserves of gas and propane in the Province and the trends in growth and discovery of gas and propane reserves and the present and future needs for gas and propane within the Province. Applications for permits for the removal of gas or propane from the Province are considered in the light of such determinations and may be granted if it is in the public interest to do so.

In carrying out its functions, the Board and its staff frequently confer with and co-operate with those Departments of the Government having functions relating to matters with which the Board must deal. This has proved particularly useful in the areas of safety requirements and pollution control.

III ORGANIZATION AND STAFF

The Board presently consists of a Chairman, Deputy Chairman and Board Member, each appointed by the Lieutenant Governor in Council to serve a five-year term. The term of office may be renewed at the pleasure of the Lieutenant Governor in Council.

The Chief Engineer and the Solicitor serve as advisers to the Board. They provide technical and legal advice and, when appointed for the purpose, function as acting Board Members. The Applications Advisory Group, under the Chairmanship of the Chief Engineer, meets weekly to discuss routine applications. The Board Solicitor and the Managers of the Oil, Gas and Development Departments participate in this Group and may also be called upon to serve as examiners at hearings.

Department Managers are responsible to the Board for carrying out the functions assigned to their Departments as set out in Section V of this report. The Departments vary in size from five employees in the Personnel Department to eighty-two in the Development Department. A detailed Organization Chart for the Oil and Gas Conservation Board at December 31, 1970 is presented on the inside of the back cover of this report.

The Spring 1971 Session of the Provincial Legislature assigned to the Board additional responsibilities with respect to coal and hydro electric, and provided for the expansion of the number of Board members to five, including a Chairman, two Vice

Chairmen and two Board Members; the Oil and Gas Conservation Board was also renamed the Energy Resources Conservation Board effective June 1, 1971.

The Board maintains five area offices located at Medicine Hat, Black Diamond, Red Deer, Drayton Valley and Edmonton. These offices are staffed by engineers and technicians whose responsibility is to inspect and report on drilling and producing procedures in oil and gas fields, and to investigate environmental control problems. The Engineer or Area Supervisor in charge of each area office is responsible to the Assistant Manager, Field Operations, who, in turn, is responsible to the Manager of the Development Department. The Board's Core Storage Center in Calgary and the Chemical Laboratory on the University of Alberta Campus in Edmonton are also maintained by the Board to assist Board staff and industry.

The Oil and Gas Departmens ensure maximum conservation of oil and gas pools being developed in the Province. The Gas Department also assists the Board in volume control of gas and propane being removed from the Province, and pollution control problems concerning gas processing. The Engineering Departments, Oil, Gas and Development, receive technical assistance from the Geology Department, Data Processing Department and the Chemical Laboratory. The Economics Department administers the crude oil proration plan with the assistance of the Oil Department and supplies statistical data and studies when required. The Accounting Department is divided into two sections, Financial Accounting, which is responsible for general accounting and budget preparation, and Production Accounting, which prepares detailed summaries of oil and gas production and disposition. The Personnel and Office Services Departments perform services for the Board organization as a whole.

The approved complement of the Board at December 31, 1970, was 299 employees, an increase of 10 over 1969. The increase in staff during 1970 was due mainly to the Board's participation in Environmental Control. The Calgary office employs 203, while the area offices, the Chemical Laboratory and the Core Storage Center employ a total of 96. Engineers and Geologists account for approximately 20 per cent of the total staff. In 1970 the Board presented its one hundredth 10-year service award, as well as its sixteenth 20-year service award.

The Employee Development Program was continued during 1970 with the Field Training Course, the Supervisory Training Course and the Board Reservoir Engineers' Winter Course being presented as in previous years. Also, a Basic English Course was introduced for any interested staff. The training of technical and professional staff was continued through the Technical Proficiency Program. Off-premises courses were attended by 85 employees with the Board providing financial assistance. Other local, national and international conferences were attended by 83 employees.

Staff terminations were decidedly reduced in 1970, when 41 terminations were recorded resulting in a 13 per cent turnover ratio compared to 30 percent in 1969. The junior clerk and stenographer categories accounted for 88 per cent of the total turnover.

IV LEGISLATIVE CHANGES

As The Oil and Gas Conservation Act and Regulations thereunder have been reviewed and rewritten in recent years, there were fewer legislative changes in 1970 than in the immediately preceding years.

Statutes

The Oil and Gas Conservation Act, 1969 was amended by chapter 85 of the Statutes of Alberta, 1970. Section 5, which sets out the purposes of the Act, had added to it a clause referring to the control of pollution above, at or below the surface in the drilling of wells and the operations for the production of oil, gas and crude bitumen. Similarly, section 22 was amended to authorize the making of regulations to control pollution. Section 56 was amended to provide that where agreement could not be reached as to the tariff to be charged by the proprietor of a common carrier pipe line, the proprietor or a person desiring to have his gas carried may apply to the Public Utilities Board to fix the tariff. Under section 81 Unit Agreements are filed with the Board, and this section was amended to make clear that the Unit Operating Agreement is a part of what must be filed. Section 105 was also amended so that the operator of a battery which has been approved is deemed to be the agent of the licensee of each well producing to the battery for purposes related to that well.

The Environment Conservation Act, being chapter 36 of the Statutes of Alberta, 1970, among other things, established a committee called the Conservation and Utilization Committee. The Oil and Gas Conservation Board is named as one of the departments or Government agencies represented on the Committee.

Chapter 5 of the 1970 Statutes also affects the Board. It amends The Alberta Gas Trunk Line Company Act and provides that where the Trunk Line Company has prescribed terms or conditions of service applicable to its pipe lines and a complaint is made by an interested party, the matter shall be heard and determined by the Board.

Regulations

By Alberta Regulations 39/70 and 123/70 the Oil and Gas Conservation Board was named as one of the authorities to which The Administrative Procedures Act applies.

During the year the Oil and Gas Conservation Regulations were amended on four occasions. Alta. Reg. 65/70 corrected certain cross references. Alta. Reg. 246/70 changed some of the provisions of the Regulations and introduced other new ones so that the pollution control provisions would be more stringent and more detailed, in order to carry out the additional responsibilities in this area given to the Board by the 1970 amendments to The Oil and Gas Conservation Act, 1969. Alta. Reg. 272/70 amended some of the provisions of

Part 9 of the Regulations to overcome certain deficiencies that had come to light in the application of Regulations relating to production accounting and applying to overproduction and underproduction; and finally, Alta. Reg. 286/70 amended section 910 of the Regulations to provide for the reduction of the allowable of a block or project where some of its wells were shut down by an order under Part 9 of the Act.

V DUTIES, ORGANIZATION AND MAJOR ACTIVITIES OF BOARD DEPARTMENTS

This section of the report deals with the make-up and principal activities of the nine Board departments. The technical departments are described first.

Before outlining the individual departmental activities, it is probably worthwhile to mention the overall activity in the consideration of registered applications. During 1970 the Board received 610 applications of the type which it registers individually. This volume increased from the 528 applications filed in 1969. Such applications are those which, if approved, would result in the issuance of a Board order, approval or permit. They are exclusive of routine applications such as those for drilling licences and well allowables which are processed on a day-to-day basis. Public hearings were held in connection with 62 of the applications, 34 of them by Board members and the balance by examiners selected from among the senior staff and appointed by the Board. Approximately 175 of the applications were considered after giving public notice for objections and the balance, having no impact on the rights of others, were dealt with directly by the Board and its staff.

Most of the Board departments are involved with the processing of applications from time to time. In fact, the functions related to applications form a large part of the work load of the Board organization. Many of the applications require extensive technical analysis and subsequent reports to the Board. The review of the performance of approved schemes also demands considerable attention from the technical departments.

In addition to the foregoing, there are other general activities in which the Board and its staff participated. One of these is contributing to the work of technical and other specialist committees of various Government and industry organizations. Among the organizations having Board representation in 1970 were the Alberta Advisory Committee on Pollution Control, the Provincial Mines Ministers' Conference, including the Inter-provincial Petroleum and Natural Gas Committee and its study groups, the Interstate Oil Compact Commission Committees, the Alberta Petroleum Industry Training Service, the Petroleum Technology Committee and the Computer Technology Committee of the Southern Alberta Institute of Technology, the Gas Technology Committee of the Northern Alberta Institute of Technology, the NATO Wartime Oil Organization, the War Supplies Agency of the Department of Defence Production, the Emergency Measures Organization and the National Advisory Committee on Petroleum Statistics.

The Board completed a comprehensive training program for a Petroleum Technologist of the Government of Nigeria.

A DEVELOPMENT DEPARTMENT

The Development Department is responsible for matters within the Board's jurisdiction concerning the drilling, completing and producing of wells and control of pollution in oil field operations.

The Department is divided into two main sections: the Drilling & Production Division under the Assistant Manager, Drilling & Production, and the Area Offices and Chemical Laboratory supervised by the Assistant Manager, Field Operations. The responsibilities, functions and organization of the divisions are described in more detail below.

(a) Drilling & Production Division

This Division's responsibilities are to ensure the proper location of wells and, by specifying requirements for the casing, cementing and abandoning of wells, to reduce the possibility of subsurface contamination and blow-outs. For producing wells the Division requires proper measurement of produced and injected fluids, both on a pool-wide and individual basis. The Division is also responsible for such matters related to production as control of air, water and soil pollution and reduction of physical waste, approval of new types of production equipment, disposal of produced water, approval and surveillance of multizone completions, and control of common flow lines.

The major functions of the Division are

(1) to process applications to drill, suspend, rework, plug back or abandon a well; to specify casing, cementing and completion practices; to calculate from directional surveys penalty factors for off-target wells;

(2) to appraise and make recommendations to the Board regarding the disposition of applications for special drilling spacing units and compulsory pooling to form drilling spacing units;

(3) to maintain files and records respecting well names and changes thereto, unit agreement areas, well licences, well licence transfers, amendments and cancellations, and appointment of agents;

(4) to review drilling and service rig inspection reports from the Board field staff, and correspond with contractors regarding the recommendations arising from the rig inspections;

(5) to co-ordinate field staff inspections of measurement practices, well testing procedure and production recording, and to

correspond with the operators regarding the results of these inspections; to perform periodic audits of company production accounting methods at their central offices;

(6) to deal with requests for exemption from gas or water measurement of wells or pools and requests for reduction of well testing frequency;

(7) to appraise applications for water disposal schemes and recommend disposition of them, to review disposal methods for produced water and recommend changes to current surface disposal limits upon application or where necessary;

(8) to process applications for approval of sour gas batteries, to provide technical advice and training to the field staff and the Gas Department on pollution control, to review field reports regarding air, water and soil pollution and require operators to take the necessary steps to curb air pollution from well production facilities; and

(9) to process applications for multizone completions and common flow lines and schedule

and evaluate segregation tests on multiple completions.

The staff consists of the Assistant Manager, a Senior Drilling & Production Engineer, two staff Engineers, six Technicians, a Clerk and four Stenographers.

Activities During the Year

Pollution control occupied a major portion of the Drilling & Production Division's efforts during the year. A new engineer and technician were added to the Division to handle the increased work resulting from the Board's added responsibilities in pollution control. Courses were prepared and given to the field staff in pollution control at gas plants and producing operations. The equipment necessary to conduct plant stack sampling surveys was purchased and special courses given to selected members of the staff in preparation for this activity, which will be started in the summer of 1971. The Division requested operators to submit flow diagrams and production accounting resumēs for all gas plants in the Province so that material balance calculations of sulphur emission rates could be made with better accuracy.

Numerous regulations and directives concerning pollution control were drafted and issued. Roles documents, describing in detail the pollution control responsibilities of other Government departments were discussed at length with five departments during the year, but only one was completed and published as IL 70-33.

Two inquiries were held, one regarding a major oil spill and the other dealing with continued failure to burn sour gas produced at a battery. Four prosecutions were launched during the year, three for smoking and one, unsuccessful, for failing to set surface casing deep enough to protect a nearby farm water well.

Three leaking wells were abandoned by the staff during the year. Two wells were flowing non-potable water and the third was leaking gas close to a private residence. Several other minor surface and subsurface abandonments were completed for a total expenditure of about $82,000.

(b) Area Offices

The chief duties of the area offices are to ensure that The Oil and Gas Conservation Act, 1969, the Regulations thereunder, and the various other requirements of the Board are observed by the industry at the field level. Area office personnel gather drilling and work-over data, check subsurface pressure data using Board equipment, and procure fluid samples for analysis by the Chemical Laboratory.

To carry out these responsibilities, there are a number of separate duties which together comprise most of the work load of the area offices.

The major duties are

(1) to advise operators on the requirements of the Act, Regulations and Board policy regarding field operations;

(2) to issue or approve abandonment and casing programs;

(3) to check wells, batteries, measurement equipment and drilling and service rigs for compliance with the Regulations; to witness dual completion operations, segregation tests, back pressure tests and casing and abandonment operations;

(4) to carry out subsurface pressure measurements, calibrate pressure instruments and gather representative samples of oil, gas and water for analysis;

(5) to check operators' production practices and reporting procedures and make reports on gas processing plants, salt water disposal systems, pressure maintenance projects and gas conservation schemes;

(6) to inspect oil or gas field operations which might cause pollution of air, soil or water and take the necessary steps to prevent occurrence of pollution; and to investigate and take appropriate action when pollution complaints are received;

(7) to prepare weekly drilling progress and rework reports.

Organization and Staff

Five Area Offices at Edmonton, Drayton Valley, Red Deer, Medicine Hat and Black Diamond are supervised by Area Engineers or Area Supervisors who report to the Assistant Manager, Field Operations in Calgary.

At the end of 1969, the total field staff complement consisted of two Engineers, 54 Technicians and Clerks and six Stenographers.

Activities During the Year

No major oil or gas fields appear to have been discovered during 1970 and drilling activity declined slightly from the level of previous years. The Meekwap and Shekilie oil pools were the only discoveries of any significance, but neither could be considered to be a major discovery. Gas well development in southern Alberta, the foothills and Kaybob were the scenes of the main concentrations of activity.

Pollution inspections displaced much of the normal field work during the year as some 13,000 well and battery sites were inspected, including 900 in Swan Hills where sloppy housekeeping received major publicity. Staff and vehicles were added to the field organization to provide better surveillance and enforcement of the Board's pollution requirements.

Initial inspections of all gas processing plants were made to check for compliance with the Board's new pollution regulations. Wells and batteries handling sour production were also re-inspected to ensure that the newly-required equipment is installed.

Numerous pollution complaints were investigated by the field staff, mostly resulting from odour or smoke. The Joffre Field was the source of many complaints as residents of Red Deer reached a limit to their tolerance of odours from the field north of the city. The development of an air blast in a battery pit to incinerate oily waste without smoke was initiated during the year. Early testing confirms that a ring of air jets around the pit can ensure smoke-free burning of oil.

(c) Chemical Laboratory

The duties of the Chemical Laboratory, located in Edmonton, were revised considerably during the year. Its responsibility for selection and analysis of samples of oil, gas and water from various pools in Alberta was discontinued and the operators were required to collect and analyze fluid samples from all pools. The laboratory continued to collect, assess, classify and file the results of gas and fluid analyses submitted by well owners for samples from wells drilled outside of designated fields in addition to those now required for all pools. From these data sources, representative analyses for most of the oil and gas production zones of the Province are selected and published. The Laboratory's major analytical investigations are now related to production, disposal, pollution or pressure maintenance problems encountered by the field staff. Certain facilities are made available to the University of Alberta, and the Chief Chemist provides a limited amount of assistance with research projects of both the University and the Research Council of Alberta.

The analytical and clerical work is performed by two Technicians and two Typists and is supervised by the Chief Chemist.

Activities During the Year

The number of pool analyses performed by the Laboratory decreased from 333 to 218 as a result of the policy change described in the preceding paragraph. The number of special analyses increased from 95 to 308, resulting in an increase of some 25 per cent in the total number of analyses performed. The Chief Chemist continued to work with the field staff and members of other Government departments in pollution control activities. In addition, an extensive field sampling program for the Research Council of Alberta was co-ordinated by the Laboratory staff.

B OIL DEPARTMENT

Responsibilities and Functions

The Oil Department is concerned with matters affecting conservation and correlative rights in crude oil production operations. It is responsible for the assessment of enhanced recovery schemes, concurrent production schemes, reserves and productive capacity of oil pools, oil well spacing, oil sands schemes, experimental schemes, and technical matters relating to the proration plan.

The principal functions of the Oil Department are

(1) to determine initial and remaining oil reserves, reserves growth trends and maximum rate limitations of production;

(2) to ensure that adequate sample density and measurement standards are achieved respecting oil pool reservoir fluid analyses, ordinary core analyses, special core analyses, fluid interface measurements and reservoir pressure measurements;

(3) to review the performance of all oil pools and enhanced recovery schemes therein, and recommend to the Board means of improving conservation in pools where it is feasible;

(4) to assess applications for enhanced recovery schemes, concurrent production schemes, pilot tests and commercial and experimental oil sands schemes, and assess in co-operation with other departments applications concerning water disposal and production measurement;

(5) to assess applications and prepare Board orders or approvals respecting oil well

drilling spacing units, production spacing units, blocks and projects and related matters;

(6) to initiate Board orders for fields and pools; to maintain records as required for the everyday administering of crude oil production allowables; to advise the Board respecting ultimate reserves, recovery factor modifiers and maximum rate limitations, and to advise the Economics Department in the preparation of the monthly crude oil production allowable order; and

(7) to develop and sustain special technical capability needed to perform advanced reservoir studies; e.g. petrophysics, reservoir simulation, transient well flow, miscible and thermal recovery methods, etc.

Organization and Staff

The Oil Department is separated into two divisions. The Reserves Division is responsible for evaluation of oil reserves, oil productive capacity and maximum rate limitations, and for assessment of applications respecting concurrent production, oil well drilling spacing units, production spacing units, blocks and projects. Also within the Reserves Division are technical specialists concerned with petrophysics, reservoir fluid properties and reservoir simulation techniques.

The Projects Division is responsible for evaluation of proposed enhanced recovery schemes, promoting implementation of and surveillance of enhanced recovery operations in conventional crude oil pools and surveillance of oil sands recovery schemes and experimental schemes. Also within the division are specialists in miscible and thermal recovery methods and transient well flow phenomena.

During 1970, the Oil Department staff included 14 Engineers (four below the approved complement), 20 Technical Clerical Assistants, two Stenographers and one Typist.

Activities During the Year

(a) Reserves Division

The work of the Reserves Division tends to remain more or less stable from year to year, rising only modestly with new field discoveries and decreasing only modestly in periods of low development activity. During 1970, the activities in the division conformed to the pattern occurring during 1969 when the main emphasis was on refining reserves interpretations for established pools. The Reserves Division processed approximately 200 reserves submissions during the year, including submissions for 60 pools considered at the annual crude oil reserves hearing. The division also processed approximately 120 applications for new well allowables, a number substantially below the annual average of about 300 for recent years.

Applications for spacing changes, annual accounting, good production practice, concurrent production, GOR and WOR penalty relief totalled about 90, or nearly the same as in 1969. An interesting development respecting well spacing has been the trend toward infill drilling in a few pools where well head productive capacity has been outstripped by the demand. This trend is expected to pick up momentum in the coming year.

Many of the problems respecting pool interpretation in the reef pools of the Zama Field and adjoining fields were resolved during 1970. Part of the impetus for resolution came as a result of a statistical study of Keg River oil pools prepared by the Board staff. Following a Board hearing to consider the study, the policy of assigning 160 acres to new discoveries was modified to provide for a proper interpretation of pool size within seven months of discovery.

Within the Reserves Division there is provision for technical specialists in the areas of reservoir simulation, petrophysics and reservoir fluid properties. The Oil Department played an important role, not only in the development of reservoir simulation capability, but also in application of reservoir simulation techniques during 1970, as it performed the following simulation studies:

2 studies using Board ID - 3P model
6 studies using Board 2D - 2P model
5 studies using SSC 2D - coning model
1 study using SSC 3D - 3P black oil model

The Petrophysics Section was reorganized in 1970 with the assigning of two engineers and one technician to the group responsible for special core studies, methods of predicting static and dynamic fluid saturation distribution in reservoirs, interface advance interpretations and reservoir fluid PVT properties. Totals of 54 special core studies, 146 interface measurements on 35 pools and 54 PVT samples were received during 1970. Overall this represents a modest increase from the previous year. Extra effort was given to developing a Zama-Virgo PVT correlation, developing guidelines for improved fluid sample quality and coverage, extending utilization of interface observation methods and refining the application of special core studies.

In view of the increasing demand for Alberta crude oil, there has been increased attention respecting the immediate and long term productive capacity of Alberta conventional crude oil pools. In this connection submissions were received at the annual reserves hearing and projections were developed for MER, well head productive capacity and effective capacity after adjustment for gathering and pipe line limitations. While there was a large margin during 1970 (about one half million barrels per day) between well head productive capcity and available pipe line capacity to move crude oil to available markets, this margin may rapidly disappear if pipe line capacity is expanded to meet market growth and if there is a continuing low trend in crude oil discoveries in the Province.

The Proration Section participated in widely diverse functions during the year, including maintaining the MD system, processing of PSU and block applications, processing of GPP applications, assistance with pool performance charts, assistance in drafting revisions to the Act and Regulations, development of computerized reserves tabulations, major assistance in resolving discrepancies between records applied for MD allowable purposes and those applied by accounting systems, and scrutiny of annual pool production records for authenticity. Total PSU, block and project applications were 340 or nearly the same as during 1969.

(b) Projects Division

The Projects Division processed 33 applications for new enhanced recovery schemes, 4 applications to terminate schemes and 157 applications for amendments for an overall increase of about 20 per cent in applications in 1970 compared with 1969. Current and potential future additions to crude oil reserves as a result of new schemes, totalled 94 million STB during the year, a substantial decline compared to recent years. Probably the most significant new scheme approved in 1970 was the 25-pool solvent flood integrated scheme in the Zama-Virgo area to be implemented by Hudson's Bay. It is expected to provide an increase in ultimate reserves of some 31 million STB over and above that obtainable under primary depletion. Of this amount, 7 million STB is attributed to the integrated aspect of the scheme provided for under section 34, subsection (2) of The Oil and Gas Conservation Act. In the Rainbow area, Banff extended its solvent flood scheme to include active solvent flooding of the Rainbow Keg River EEE Pool and the Rainbow Keg River O Pool. Although it had been previously anticipated that conversion of the O Pool would not be required for a number of years, the advent of increased allowables and indications of unfavorable well bore drawdown in the Keg River A Pool prompted the decision to convert the O Pool to active solvent flooding during 1970.

The Projects Division promoted enhanced recovery studies in a few widely scattered pools in the Province. Generally, however, it focused much of its attention on the Zama area where there was a high frequency of rapidly declining pool pressures. The staff studies included investigation of initial and current reservoir pressures, bubble point pressures and current pool performance for nearly 300 pools in the Zama basin. Having regard for the numerous communicating single-well reef pools and the high costs of development and operation, the Projects Division tried to foster the co-ordinating of enhanced recovery schemes among operators in the area.

The Projects Division received some 330 progress reports during 1970, up from 294 in 1969. Of these, it reviewed some 270 schemes with attention being given to replacement ratios, special GOR provisions, pressure level clauses and the like. The reviews resulted in removal of the RFM for six schemes in accordance with the policies provided under section 914 of the Regulations and in assigning of probationary status for 23 additional schemes.

An indication that enhanced recovery operations in the Province are maturing was the fact that there were four applications for abandonment of schemes. Until then, only a few schemes, such as those in the Joffre Viking and Gilby Viking Pools, were sufficiently advanced to warrant the contemplation of their abandonment. Two schemes for which abandonment was proposed were in the Pembina Cardium Pool and the recovery indicated under water flooding was substantially lower than that previously predicted. Although this could not be taken as a general indication of future performance in the pool, it drew attention to the fact that certain areas of the pool will not yield increased oil recovery by conventional water flood techniques.

Two areas of specialization in the Projects Division are bottom hole pressure and transient well flow, and solvent flood technology. In both of those areas, significant developments occurred during 1970. Conventional bottom hole pressure surveys and calibrations were up slightly to 6,000 entries from 5,400 entries in 1969. Investigation of well transient flow phenomena and utilization of this technology for interpreting reservoir size and flow properties were applied to approximately 20 cases during the year of which perhaps a half a dozen cases were found to be useful. A manual respecting bottom hole pressure and acoustic well sounder practices was all but completed and will be published in 1971. Respecting the subject of miscible flood technology, the equivalent of approximately a half man-year was devoted to study of solvent flood technology including preparation of a review paper on solvent flooding for presentation at the World Petroleum Congress.

In the heavy crude oil category, there were four new enhanced recovery schemes implemented with an indicated increase of about 15 million STB by conventional water flooding. Attempts to continue conventional water flooding in the highly viscous crude oil at Lloydminster now appear to be fruitless and applications to abandon schemes have been received and approved by the Board. It therefore appears that imaginative new techniques will have to be developed if any significant recoveries are to be obtained from the large, heavy oil deposits at Lloydminster.

Although activity in oil sands development and experimental schemes was relatively quiet in 1970, renewed interest appeared to be developing at year end. The GCOS operation, although not yet operating at its target level of 45,000 barrels per day, enjoyed a significant improvement in performance and averaged 33,000 barrels per day in 1970 as compared with 28,000 barrels per day for 1969. Synthetic crude oil production during 1970 therefore amounted to 12 million STB.

General Activities

Matters of policy which the Oil Department promoted or was directly involved in during 1970 included: annual accounting policy; revision to underproduction and overproduction regulations; automatic waiver of penalties for single well pools; revisions to MRL regulations for heavy crude oil pools; informational letters concerning Board policy on good production practice, oil pools underlying and straddling Provincial boundaries, use of crude oil for fuel in enhanced recovery schemes, casing salvage programs, need for co-ordinated enhanced recovery schemes in the Rainbow-Zama areas, need to provide adequate fluid supply and injection capacity in enhanced recovery schemes; and special concurrent production policy in Provost.

The Oil Department participated in such investigations as the oil proration forecasting program, field/pool summary file, CARE package, Board laboratory usage, fluid measurement accuracy, crude oil productive capacity, crude oil character and availability for power generation, general well data file and improved systems for surveillance.

Turnover in engineering staff was fairly high during the year so that the actual complement of engineers averaged four less than the approved complement of 19. As a result, work on certain special objectives had to be either seriously curtailed (well coning, well transient flow, petrophysics) or simply set aside (optimum recovery analysis flanking oil zone and gas caps).

Regarding technical proficiency, the Oil Department technical staff participated extensively in most in-house courses and it contributed directly in presenting technical sessions on transient flow, solvent flooding, and evaluating oil reserves and enhanced oil recovery schemes. About one-third of the engineering staff participated in post graduate study programs in a variety of subjects including natural gas processing, heat and mass transfer, fluid flow in porous media and management training. Total engineering participation in courses, seminars and conferences amounted to 300 man-days during 1970, or nearly equal to the 10 per cent target for technical proficiency.

C GAS DEPARTMENT

Responsibilities and Functions

The Gas Department is concerned with the conservation of gas and related products, including propane, butanes, pentanes plus and sulphur. The Department is also responsible for the determination for the province of the reserves and deliverability of gas, natural gas liquids and sulphur. In addition it assesses the availability of gas to meet the long term requirements of the various utility systems in the Province and the existing commitments for the removal of gas from the Province. During 1970, the Department assumed certain pollution control responsibilities related to the production and processing of gas.

Specifically, the Department has the following functions:

(1) in the administration of The Oil and Gas Conservation Act, 1969

  (a) to determine reserves in all pools throughout the Province of gas, propane, butanes, pentanes plus and sulphur and the reserve growth trend for gas;

  (b) to establish permissible rates of production for gas wells, to determine frequency of gas well tests and to prescribe methods of testing wells and calculating flow potentials;

  (c) to make studies of the need for the installation of gas conservation schemes, and to review the performance of all established schemes;

(d) to assess the need for gas cycling schemes to conserve natural gas liquids, to review the performance of existing cycling schemes, and to assess the suitability of proposed schemes for the depletion of gas pools;

(e) to assess from a conservation viewpoint the suitability of proposed gas processing facilities, and to review the performance of installed gas processing facilities;

(f) to establish for proposed gas processing facilities the permitted volumes of pollutants which may be emitted to the atmosphere and the conditions of emission, and to assess the measurement methods thereof;

(g) to review regularly and at the request of the Public Utilities Board, the requirements for and availability of gas to small gas utility systems;

(h) to review, at the request of the Department of Mines and Minerals of the Provincial Government, applications to construct pipe lines and to advise the Department of the Board's findings; and

(i) to review the production performance of all gas pools and to recommend to the Board means of improving conservation where it is feasible; and

(2) in the administration of The Gas Resources Preservation Act, 1956

(a) to determine the Province's reserves and the reserve growth trends for gas and for propane in order to assist the Board in assessing applications for their removal from the Province;

(b) to determine the deliverability of gas produced from fields connected, or expected to be connected, to intraprovincial markets and extraprovincial markets at such time that applications for removal of gas from the Province are considered by the Board; and

(c) to determine the availability of propane in the Province at such times as applications for removal of propane from the Province are considered by the Board.

Organization and Staff

The Department is primarily technical in nature and is headed by the Manager. The Assistant Manager is responsible for the day-to-day operations of the Department. The Reserves Section is responsible for the evaluation of gas reserves, the establishment of permissive rates of production for gas wells, and the surveillance of existing gas utility systems. The Projects Section appraises proposals presented to the Board concerning the cycling of gas pools and the processing of raw gas to produce marketable gas, natural gas liquids and sulphur. It also estimates the reserves of propane, butanes, pentanes plus and sulphur. The Conservation Section is responsible for the surveillance of existing gas processing plants and gas conservation operations in oil and gas fields, and for studies of the feasibility of conserving oil field gas.

The total Department staff comprises seven Engineers, nine Technicians, a Stenographer and three Clerks. One processing plant engineer and one technician were added to the staff during the year to perform new pollution control duties.

Activities During the Year

One of the Department's major activities during the year was the drafting of and administration related to new regulations concerning pollution control at gas processing plants. The new regulations became effective August 1, 1970, and set out the requirements of applications for new plants or expansions of existing plants. They also set out the responsibilities of operators to control the emission of pollutants from a plant and prescribe certain measurement requirements.

In light of its new responsibilities with respect to pollution control, the Gas Department is combining Department of Health and Board plant approvals into a single approval. This program was 75 per cent complete at the year end.

The Department was involved in the consideration of six applications under The Gas Resources Preservation Act, 1956 for amendment of existing permits to allow the removal from Alberta of a total of some 4.4 trillion cubic feet of gas and 8.2 million barrels of propane. Applications for 0.6 and 1.0 trillion cubic feet of gas were granted in full, as was an application for removal of 8.2 million barrels of propane. Decisions were pending at the year end respecting application for 1.4 and 1.5 trillion cubic feet of gas. In assessing these applications and in determining year end reserves, estimates of gas, natural gas liquids and sulphur reserves of some 700 pools were considered in varying degrees of detail.

The gas reserve work performed during the year utilized pressure decline to an increased extent reflecting improved gathering and processing data and the accumulation of considerable history for a number of pools. In addition, the Department did a greater amount of liaison with operators concerning reserves in major pools, and a complete review of the reserves of hundreds of pools, mostly small in size, considered beyond economic reach or lacking wells capable of producing.

In the assessment of applications for removal of gas and propane from the Province, consideration was given to the deliverability of pools either supplying gas to local utilities or included in permits, and to the long term availability of propane.

Studies were made of the feasibility of conserving gas produced with oil in all or part of five fields, and in two multi-field areas including the Zama area of north-western Alberta. A hearing was held to consider the need for gas conservation in the Provost Field and Board inquiries were held to consider deficiencies in gas conservation operations in three fields. In order to improve the surveillance and administration of the gas flaring limitations for gas conservation schemes, all gas conservation orders were amended to stipulate quarterly as well as annual limits on flaring.

During the year, the Department considered five applications involving the cycling of gas in pools rich in natural gas liquids. One of these was for a new scheme for cycling of the gas cap of the Bonnie Glen D-3 A Pool using available solution gas processing plant capacity; however, the spare capacity has since been taken up due to increased oil production rates and the gas cap cycling scheme has been deferred pending plant expansion. The other applications were for modification of existing scheme approvals, mainly respecting the location of injection wells in the Kaybob South Field.

The Department considered 45 applications concerning gas processing plants during the year, many in greater detail than had previously been necessary because of pollution considerations. Some 15 of these were for new plants, 17 were for expansion of existing plants and 13 were for miscellanoous amendments to plant approvals. The largest plant to be considered was the Ram River Plant. It will process up to 220 million cubic feet per day of sour gas from the Strachan and Ricinus West fields. The plant will produce approximately 2,000 long tons of sulphur per day and will incorporate the first gas plant sulphur stack clean-up facilities to be used in Alberta.

An application to modify the design and increase the capacity of a gas reprocessing plant to be constructed at Empress was considered and approved. When the plant goes on stream it will have a capacity of 1.5 billion cubic feet of gas per day rather than the 1.0 billion initially approved. The daily production of natural gas liquids will be increased proportionately, and there will be a significantly greater than proportionate increase in the production of ethane to be used initially for fuel.

The Department considered eight applications concerning the underground storage of gas and natural gas liquids. Three of these were for new schemes and five were for amendment of existing approvals, mainly to increase permitted storage volumes.

Other applications were processed during the year, including some for commingling of production from pools and others for production of wells or pools at rates consistent with "good production practice". The permissible gas production rates for 12 pools were considered at a public hearing, and orders were issued to regulate the maximum production rates at wells in several of these pools.

The Department participated in a number of applications or proceedings for which other departments carried the primary staff responsibility. Typical of these were applications for concurrent production of oil and gas cap gas, solvent flooding of oil pools, special well spacing, modification of measurement requirements and a comprehensive study of future Alberta gas usage.

The Department's participation in a transient flow study group was completed with the distribution by the group of a staff manual on testing of wells under unstabilized pressure conditions. Further important staff work included a study and internal report on the determination of gas deliverability in low permeability reservoirs, and commencement of a co-operative project to improve and co-ordinate pressure measurement and well testing programs in gas pools.

The Department also assisted in co-ordinating and contributed lecturers to a training program for junior technical staff.

D GEOLOGY DEPARTMENT

Responsibilities and Functions

The Geology Department is responsible for the preservation and evaluation of certain well data, the administration of the Board's well evaluation requirements, the mapping of oil and gas reservoirs and the preparation of subsurface geological maps. Upon request, the Department undertakes special studies to assist other Board departments and the Alberta Department of Mines and Minerals. The Department also directs the operations of the Board's Core Storage Center and the Drafting Section.

The main functions of the Department are

(1) to administer the coring, logging, drill stem testing and drill cuttings requirements of the Board and to collect and store logs and drill stem test charts;

(2) to receive, process and provide examination facilities for drill cuttings and core at the Core Storage Center;

(3) to evaluate hydrocarbon-bearing intervals at all productive wells and prepare maps to delineate the area and volume of each pool;

(4) to identify, record and publish the names and depths of the stratigraphic markers penetrated by all wells drilled;

(5) to investigate and report on the geological aspects of submissions or other evidence filed with the Board;

(6) to advise the Board, other Board departments the Department of Mines and Minerals and other Provincial agencies on geological matters;

(7) to assist the Development Department in ensuring that a well drilled to supply an oil field water injection scheme does not interfere with domestic water supplies;

(8) to develop and maintain regional geological maps and well location and well status maps for sale and on-premise use;

(9) to classify each well licensed in accordance with the Lahee classification system; and

(10) to provide all drafting services necessary for the Board's functions.

Organization and Staff

The Manager of Geology is both head of the Geology Department and Chief Geologist of the Alberta Department of Mines and Minerals. Within the Geology Department there are three sections. The Geology Section comprises the Manager, the Assistant Manager, ten Geologists, three Technicians, one Stenographer and five Clerks. The Core Storage Center is located in a separate building. It is headed by a Supervisor responsible to the Manager of Geology and is staffed by 15 employees. The Drafting Section consists of five Draftsmen, including the Supervisor who reports to the Manager of Geology.

Activities During the Year

(a) Geology Section

During the year, stratigraphic markers were identified and published for 1,900 wells and hydrocarbon-bearing zones were evaluated for some 800 wells.

A considerable amount of time was spent investigating applications and submissions received from operators on such matters as gas export, pressure maintenance, good production practice, concurrent depletion, oil reserves and allowables, production and drilling spacing units and special target areas.

Miscellaneous activities included classifying wells, determining casing requirements, collecting stabilized pumping levels on water supply wells, investigating near-surface blowouts in areas where test hole applications were received, and appraising logging and coring programs and abandonment applications.

Regional projects included the revision and publication of maps showing structure contours on the Base of Fish Scales and Milk River horizons. Evaluation of the oil sands reserves in the Cold Lake area was started and is continuing.

The major computer projects were in the field of reservoir mapping, reservoir simulation, regional mapping and investigations into the quality of the data on the magnetic tape file.

Geological work for the Department of Mines and Minerals consisted of evaluating parcels for Crown reserve sales, processing P. & N. G. reservation reports for lease rental credit, preparing zone designations and providing technical advice on applications for gas leases.

(b) Core Storage Center

Public examination of core and drill cuttings continued at a high level. An average of about 28 geologists used the facilities each working day. A total of 86,000 boxes of core and some 600,000 drill cutting samples were examined during the year.

Some 300,000 sets of drill cuttings were sorted, washed and stored. In addition, 9,600 boxes of core were received into storage. To provide space for the incoming core, 34,000 boxes of backlog core were re-packaged in the smaller cartons currently in use.

The Center reduced its complement of staff in keeping with the decreased core and sample deliveries.

(c) Drafting Section

During the past year, over 100 maps were up-dated on either a weekly or monthly basis and a number of new maps were drafted. A significant portion of the time was spent preparing oil and gas pool performance charts, gas plant performance charts and various forms for the Data Processing Department.

E DATA PROCESSING DEPARTMENT

Responsibilities and Functions

The Data Processing Department is responsible for carrying out systems planning, program development, computer operations, staff training related to data processing, and for reviewing data processing advances and new equipment development.

More specifically, the functions of the Department are

(1) to analyze existing and proposed manual and computer systems with a view to designing and implementing new systems, improvements and innovations;

(2) to write engineering, accounting, statistical and economics related computer programs as required in the work of the Board organization;

(3) to accurately process data received from other departments and industry in order to obtain statistics for internal use or for publication;

(4) to perform computer calculations for geological and for oil and gas engineering evaluations;

(5) to carry out effective closed-shop programming by educating department staff and by maintaining

an appropriate literature and program library;

(6) to encourage open-shop programming by educating staff from other departments and by assisting with open-shop programming assignments where necessary;

(7) to advise the Board on advances in the field of computer technology; and

(8) to familiarize supervisors and personnel throughout the organization with computer applications, data processing and effective systems planning.

Organization and Staff

The Data Processing Department is divided under the Manager into three divisions. In addition to assisting the Manager in the administration of the Department, the Assistant Manager assumes specific responsibility for the Programming Division. The Systems Supervisor and the Supervisor of Operations assume the direction of their respective divisions and report directly to the Manager. The remainder of the staff comprises one Systems Analyst, seven Programmers, eight Computer or Keypunch Operators and a Stenographer.

The Programming Division is responsible for all computer systems and programs required by other departments in the Board organization, while the Operations Division is responsible for all functions related to machine processing. The

Systems Division works closely with other departments and the Programming Division in the development of new manual and computer systems.

Activities During the Year

During 1970, the Department encountered an increasing number of requests for systems enhancement from users who had experienced the benefit of computer assistance with existing systems. In many cases, systems modifications or expansions were undertaken immediately. Examples of these were: a helium reserves report printed as an extension of the reserves report system, modifications to the gas gravity correlation programs to facilitate use of these tables, a system injection-disposal data summary file as a supplement to existing production injection related files, modifications and improvements of the enhanced recovery surveillance system and a Q_{max} administration system as an extension of the production reporting system. In other cases, it became obvious that the requests for improvement could not be met with the existing magnetic tape sequential files. Accordingly, the Department prepared a re-evaluation of the Board's data processing procedures based on the concept of an integrated data base resident on random access disk files. It was found that the intangible benefits and economies of such a system would be very significant. Accordingly, at year end plans were proceeding to implement this scheme in stages, with the first phase relating to the integration of the production, injection and adjustments files intended to be operational by January, 1972.

Significant new applications implemented during 1970 were: a program system to print the Weekly Drilling Reports (drilling wells) and interface with the existing General Well Data File (completed wells), specialized versions of material balance programs, an experimental program to evaluate the quality of geological tops in the General Well Data File, and a system to administer gas and water credits.

During 1969, a Reservoir Simulation Project Group consisting of two members of the Data Processing Department and two representatives of the Engineering Departments, was organized by the Board to acquire reservoir simulation capability for its staff. During 1970, the group completed the development of a one dimensional-three phase compressible model and a two dimensional-two phase compressible model. In addition, after reviewing available systems, the group recommended and the Board proceeded with the purchase of a three dimensional-three phase compressible model, a two dimensional-three phase coning simulator and a two dimensional compositional reservoir model, together with a graphics program for the display of output data. At year end selective use of the available reservoir simulators was being made.

During the year, both the Systems and Programming Divisions were involved in the review and feasibility study of changes in the underproduction regulations implemented in late 1970. The changes required extensive consultation with other Departments of the Board and industry and culminated in extensive changes to the Allowable Surveillance System of programs.

The Systems Division, in co-operation with other Departments, prepared a review of the many industry surveillance operations of the Board. The study had many ramifications, some of which could be acted upon immediately and others which are still being considered. Other areas that the Systems Division has investigated are: Salary Data Processing, the need for a private telephone line to the Edmonton Field Office, a lease inspection scheduling and surveillance system, a field-pool data system and a system for gas plant-gas gathering statistics.

During the year the Operations Division was concerned primarily with the routine encoding and processing of business and technical data for the organization. The Division also continued the improvement of schedules. In October, 1970 our machine configuration was altered by increasing computer core from 32K to 64K. At year end, the Operations Division was in the process of changing scheduling and programs systems to take maximum advantage of this increased core. Multi-programming in particular had resulted in increased machine efficiency. During the year approximately one-quarter of the computer time was used for program development and the remainder for a variety of production runs. Approximately two shifts per day, very often supplemented by extended shifts, are required to maintain the Board's work load. Some 13,000 individual jobs were processed through the computer system during 1970.

F ECONOMICS DEPARTMENT

Responsibilities and Functions

The Economics Department is responsible for economic analysis and evaluation, the compilation of statistics and forecasts and the preparation of the monthly proration order.

The main functions of the Economics Department are

(1) in co-operation with the Oil and Gas Departments, to forecast demand and supply for liquid hydrocarbons, sulphur and natural gas in the Province of Alberta;

(2) to prepare a five-year forecast of petroleum industry activity relative to the functions of the Board to serve as a basis for the Board's annual five-year expenditure and revenue forecast;

(3) to carry out special studies relating to economic aspects of conservation and applications presented to the Board;

(4) in co-operation with the Oil Department, to carry out the monthly oil proration computations;

(5) to assess the competitive position of Alberta crude oil in existing and potential market areas; and

(6) to compile statistical and other information covering all aspects of the oil and gas industry.

Organization and Staff

The staff complement at December 31, 1970, comprised the Department Manager, three Economists, an Economics Assistant and two Clerks.

Activities During the Year

A major portion of the Department's work during 1970 related to the first of hearings to be held by the Board every three years to determine the Province's 30-year requirements for gas and 30th-year peak day requirements. A submission containing forecasts of gas requirements by various demand categories and incorporating detailed regional estimates of population was prepared by the Department and presented at the hearing. At the year end the new estimates of the Province's gas requirements had been finalized by the Board, and the Department was in the process of preparing the report on the hearing.

During the year the Department assisted in the preparation of the Annual Reserves Report and in projects related to three applications for amended permits authorizing the removal of additional gas and propane from the Province. These included applications by Alberta and Southern Gas Co. Ltd. and Trans-Canada Pipe Lines Limited for additional volumes of 578 billion cubic feet and 960 billion cubic feet of gas, respectively, and an application by Dome Petroleum Limited and TransCanada GasProducts Ltd. to remove an additional 8 million barrels of propane. The latter application necessitated a review by the Department of the Province's 30-year propane requirements.

The Department updated its forecasts of oil demand and has continued to make frequent use of the proration forecasting programs. Major developments affecting the demand for Alberta oil during the year were changes to the United States Oil Import Policy and Canada's National Oil Policy. At various times during the year, the Department handled enquiries regarding the availability of specific types of Alberta oil which were exempted from the new regulations governing imports of Canadian oil into the area of the United States east of the Rockies. The effectiveness of the National Oil Policy was assessed, on a regular basis, throughout the year. The Department also updated its estimates of productive capacity within the Province and extended the analysis to the capacity of the major pipe lines which transport Alberta oil outside the Province. Based on data assembled by the Department, an Informational Letter was issued by the Board in October comparing the near term availability of oil in Alberta to extraprovincial pipe line capacity. A commencement was made on work relating to the longer term development of capacity within the Province.

The Department co-ordinated the work of an underproduction regulations committee which developed proposals for revisions to the underproduction carry-forward regulations. The Board circulated two proposals to industry in March and, following a meeting to hear industry's views, new regulations were put into effect in October. Members of the Department also served on committees concerned with the publication of Board statistics and the analysis of reserve growth trends.

The Department continued to investigate the application of techniques of economic analysis to problems in the petroleum industry, including the use of transportation models. In 1970, the Department completed a number of refinements to the group of population programs developed during the past two years and, at year end, was in the process of revising its Manual for Economic Evaluation.

G ACCOUNTING DEPARTMENT

The Accounting Department's responsibilities are carried out under two separate divisions, Financial Accounting and Production Accounting. The Manager of Accounting is the head of the Department and reports to the Board.

(a) Financial Accounting Division

Responsibilities and Functions

The Financial Accounting Division is responsible for all general accounting and budget preparation. It assists in the collection of the Board's annual tax levy and provides the Board with all information for budget control.

The major functions of the Division are

(1) to process all expenditures, receive all revenues and maintain all necessary records;

(2) to close the accounting records as at March 31 each year and co-operate with a representative of the Provincial Auditor in his annual audit;

(3) to prepare, in co-operation with the other departments, the budget for Board approval for the next fiscal year and prepare a five-year forecast of expenditure and revenue;

(4) To provide the Board with monthly statements comparing budgeted and actual expenditure and revenue, to assist in the maintenance of control over expenditure, and to establish current financial policy;

(5) to assist, in co-operation with the Assistant Assessor, in the collection and follow-up of outstanding tax accounts;

(6) to maintain records necessary to the control

of all inventorial assets of the Board and to supervise the annual physical check of inventory items.

Organization and Staff

The Financial Accountant is the head of the Division and is responsible to the Manager of Accounting. The staff complement at December 31, 1970, included the Financial Accountant, four Accounting Clerks, one Typist and a Bookkeeping Machine Operator.

Activities During the Year

During 1970, the general accounting functions embracing revenues, expenditures and budget were routine.

(b) Production Accounting Division

Responsibilities and Functions

The Production Accounting Division is responsible for the receipt and processing of oil and gas production and disposition reports, and the preparation of detailed and summary information for use by the Board, industry and other agencies. The Assessment Section also is a part of the Production Accounting Division.

The major functions of the Division are

(1) to collect from industry the well production data and well and plant disposition data required under The Oil and Gas Conservation Act, 1969;

(2) to ensure that the reporting forms in use provide for the collection of required information and are revised to meet changing needs; and to co-operate with other Provincial and Federal agencies in the use of comparable forms, and in the avoidance of duplicate collections of original data, where possible;

(3) to examine the reports received to ensure that regulatory requirements are met by the operators and, with the assistance of the Data Processing Department, to prepare detailed and summary records;

(4) to check the reported oil, gas and water production against assigned allowables and notify operators of the over or under status for each of their wells;

(5) to ensure that the monthly and annual statistical reports and well and pool production publications are kept up to date and processed on schedule; and

(6) to prepare the assessment roll, to issue assessment notices, process appeals, issue tax notices and assist in the collection of the tax levy.

Organization and Staff

The Production Accountant and Assessor is the head of the Division and is responsible to the Manager of Accounting. He is assisted by the Assistant Assessor, the Statistics and Publications Supervisor, the Production Supervisor, the Departmental Systems Analyst, 19 Clerks and a Stenographer.

Activities During the Year

The year 1970 was a busy period for the Production Accounting Department.

In the Report Processing Division, most of the emphasis in 1970 was concentrated on improving the accuracy of production records and increasing the processing efficiency by making 28 major revisions to some 60 programs and by the establishment of a separate Surveillance Section.

Further development of computer techniques was also implemented with a number of comparison programs. Comparisons between the following files are now carried out on a regular basis: production, injection, allowables, basic well data, proration and batterh approvals. This has resulted in more up-to-date and accurate information on the various master files.

The separate subsection, the Surveillance Group, was formed in this division to liaise directly with industry in an effort to reduce reporting errors and decrease report processing times. Substantial improvements have been noted. This section also conducts regular cross-checks of the various disposition statements sent in to the Department.

Greater emphasis was placed by the Board on the timeliness of reports due on the fifteenth of each month. This has resulted in the receipt of reports at an earlier date than previously, and has materially improved the processing schedules. Co-operation from industry has been excellent.

Conversations have been held with industry regarding the submission of Product Disposition (S-2) data in tape or card form. At this date only one large operator submits this data on tape and the results are very satisfactory.

In the Allowables Section, the main change in 1970 concerned the underproduction regulations. These changes were discussed with industry over a period of many months and were finally implemented on October 1, 1970. The new regulations are more difficult to apply and have created a number of problems in the initial stages. As a result there have been increased communications with the Production Accounting Departments of many companies, which it is expected will decrease as the system becomes better understood. Internally the transition to the new scheme was accomplished with a minimum of difficulties.

This year the Board supplied the allowable status to one large operator on magnetic tape. This has met with a favourable response from both the company and the Board. The comparison of the allowable status by machine results in a more timely recognition of errors and differences, which is reflected in a significant decrease in differences between the two sets of records, and a quicker recognition of problems such as excessive overproduction. This Board service is available to any company which can make use of it.

In the Statistics Division, there have been substantial accomplishments during the year.

Efforts to further improve the propane and butane disposition statistics were continued. After discussions with industry, a working group of Board and industry staff was formed to draft a new LPG reporting system. The work of the group resulted in the discontinuance of marketer reporting, and the drafting of a revised plant report which would become effective with the January, 1971 reporting. The revised report requires the plant operator, from bill of lading information available to him, to report the end destination of LPG product. The introduction of the new report created considerable savings in time and effort to both the Board's and industry's accounting staff.

Revised reporting forms respecting gas gathering and processing plant operations were introduced during 1970. The new format was designed to fulfill the technical department's requirements and to facilitate completion by the operators.

In addition, better timeliness is now being achieved in the preparation and publication of statistical publications.

In the Assessment Division, with the implementation of a predictable Crown Royalty interest rate, the elimination of undrilled acreage from assessment, the elimination of the annual rate of production in the assessment calculation and the use of the "plat" rather than the written description to designate assessment areas, there has been a considerable reduction in the time required to prepare the Board's annual assessment.

H OFFICE SERVICES DEPARTMENT

Responsibilities and Functions

The Department is responsible for purchasing, printing and mailing, control of well records and central filing, building requirements and services, and switchboard and reception duties.

The major functions are as follows:

(1) to attend to space, service and insurance requirements of all Board buildings;

(2) to maintain a purchasing and stock control program;

(3) to observe and control motor vehicle operating costs;

(4) to print or arrange for commercial printing of letters, orders, forms, reports, publications, maps, amendments to Acts, Regulations and the Index of Board Orders; to maintain

address plates for subscription lists, mail lists and for various record-opening forms for new wells;

(5) to attend to all mailing functions and to operate all file systems other than department; to serve public requests for information from filed documents;

(6) to provide library services and transcriptions of public hearings; and

(7) to maintain drilling records for all wells drilled.

Organization and Staff

The Department is headed by the Manager, who reports to the Board. There are three sections in the Department: Printing and Supplies, Records and Purchasing, each headed by a Supervisor. The staff complement includes 21 Clerks, 6 Machine Operators and 6 Receptionists, Switchboard Operators, Typists and Stenographers.

Activities During the Year

During 1970, the general functions related to Records, Printing and Purchasing were routine. There were no major changes in any section.

I PERSONNEL DEPARTMENT

Responsibilities and Functions

The Personnel Department is responsible for attracting and retaining competent staff to conduct the Board's business, and also for ensuring that the Board's personnel policies and benefits are adequately and equitably administered.

The principal functions are

(1) to recruit new staff in co-operation with other Departments;

(2) to administer programs of employee performance evaluation, continuing education and employee benefits;

(3) to administer the Board's salary policy and conduct annual salary surveys;

(4) to prepare, with the assistance of the other Departments, the annual salary budget and record variances during the current year;

(5) to retain an up-to-date personnel file on each employee; and

(6) to conduct a series of induction sessions to familiarize new employees with the Board and its Departments.

Organization and Staff

The Department is headed by the Manager, who reports to the Board. He is assisted by two Personnel Assistants, one Clerk and one Stenographer.

Activities During the Year

The Department carried out its annual survey of the salaries paid by the petroleum industry and by the Provincial and Federal Governments to assist the Board in its annual salary review. The Board's Data Processing equipment was used more extensively in preparing survey results. Other surveys in which the Board participated were analyzed in order to ensure that the Board's salaries and other benefits were competitive.

During 1970 the Personnel Department presented a Basic English and a Rapid Reading Course to the staff. The Department expanded its responsibilities for employee counselling with respect to benefits, salaries and other job-related and semi-related matters. Benefits available to Board staff were summarized and a booklet prepared for each employee.

VI EXPENDITURE AND REVENUE

The Board's fiscal year end is March 31, but, since all other sections of this report relate to the calendar year the Board has decided to ignore the three month difference and treat expected expenditures and revenues relating to the fiscal year April 1, 1970 to March 31, 1971, as applying to the 1970 calendar year. Financial data for previous fiscal years are applied to the calendar year in a similar manner.

Table 1 provides a summary and comparison of expenditures and revenues for the years 1966 to 1970 inclusive. The Board's net expenditure represents the sum of salary, general operating, and capital expenditures less collections from the sale of publications and information. The cost of capital acquisition is charged in full against revenue in the year of purchase. Revenue of the Board is received through the levy of a tax upon the aseessed value of all oil and gas properties liable to assessment and by a grant from the Provincial Government.

During the last five years, the Board's net expenditure has increased at an average annual rate of 9.9 per cent. Net expenditure during 1970 was $3,005,000, an increase of $331,000, or 12.4 per cent over the previous year. Salary expenditures increased by $323,000 or by 14.2 per cent to $2,591,000. Other general operating expenses increased by $97,000 or by 13.9 per cent to $793,000 while capital expenditure increased by $27,000 to $118,000. In May, 1970 the Board assumed certain responsibilities regarding pollution and environmental control. These added responsibilities accounted for $126,000 of incremental costs or 4.3 per cent of the net expenditures. Without the additional pollution costs, percentage increases to net expenditures, salaries and general operating would have been 7.5, 10.9 and 9.8 respectively.

Collections increased by $116,000 to $497,000, due mainly to the sale of well data and core analysis files. During the years 1966 to 1969 a considerable expenditure was made to establish an historical well data file and a core analysis file on magnetic tape, to provide for the updating and maintenance of the files and to prepare programs for application of this information using computer facilities within the Board. It was recognized that access to this file would be valuable to industry, and the files were offered for sale in 1969. From these sales, $66,000 and $171,000 was received in 1969 and 1970 respectively. Other than for the annual updating charges, no further sales are anticipated.

Table 2 gives a comparison of Board expenditures in terms of wells capable of production, industry production revenue, and equivalent barrels of production*. Industry production revenue represents the total sales value of crude oil, natural gas and products at the well or plant. In 1970 the value of crude oil sales represented 76 per cent of the total production revenue as compared to 73 per cent in 1969.

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* Equivalent Barrels = total industry production revenue divided by weighted average price per barrel of oil.

The cost of operating the Board in terms of a capable well increased from $140 in 1969 to $153 in 1970. A review of these costs over a longer period indicates that Board expenditure per capable well increased steadily until 1957, when it reached $136, and then declined to $115 in 1965. Recent significant increases in salary costs, and the reduced rate of increase in the number of capable wells, due to the introduction of a new proration plan in May, 1965, have reversed that trend. Board expenditures per equivalent barrel of production revenue decreased from 0.69 cents to 0.61 cents over the period 1966 to 1969. Efficient utilization of electronic data processing equipment, and substantial increases in growth rate of industry revenue were largely responsible for this reduction in unit costs.

For 1970, the Provincial Government will provide the funds necessary to meet 50 per cent of the Board's estimated net expenditure. This amounts to some $1,502,000 and represents a direct grant from the Provincial Government. The remainder of the tax levy charged to all other owners of oil and gas properties assessed amounted to $1,503,000 in 1970, an increase of $79,000 over the previous year.

The assessed value of oil and gas properties subject to assessment in 1970 was $2,255,000,000 resulting in a mill rate of 0.68 mills to raise the portion of Board revenue met by taxation.

TABLE 1

OIL AND GAS CONSERVATION BOARD
COMPARATIVE STATEMENT OF EXPENDITURE AND REVENUE
FOR THE FIVE YEARS 1966 - 1970

(000's Dollars)

	1966	1967	1968	1969	1970
Expenditure					
Salaries	$1,778	$1,953	$2,090	$2,268	$2,591
General Operating					
Building rent, utilities	186	193	217	218	217
Printing, office supplies	89	88	84	96	90
Travelling, automobile	67	64	68	76	99
Machine rental and repairs	79	119	125	142	163
Telephone	22	27	30	32	36
Lab. and Field supplies	16	22	20	38	37
Miscellaneous	75	75	86	94	151
	534	588	630	696	793
Capital	46	51	63	91	118
Total	$2,358	$2,592	$2,783	$3,055	$3,502
Collections	237	234	297	381	497
Net Expenditure	$2,121	$2,358	$2,486	$2,674	$3,005
Revenue					
Industry	$1,114	$1,237	$1,301	$1,424	$1,503
Province of Alberta	1,007	1,121	1,185	1,250	1,502
Total Revenue	$2,121	$2,358	$2,486	$2,674	$3,005
Percentage Increase in Net Expenditure over Previous Year	13.0	11.1	5.4	7.6	12.4

TABLE 2

OIL AND GAS CONSERVATION BOARD

Comparison of Board Net Expenditure

Per Capable Well and Industry Production Revenue

	Total Capable Wells	Staff Complement at December 31	Industry Production Value (000)	*Annual Production Equivalent Barrels (000)	No. of Capable Wells Per Staff Member	Board Net Expenditure	
						Per Capable Well (Dollars)	Per Equivalent Barrel (Cents)
1966	16,980	264	791,913	307,948	64	125	.69
1967	17,586	265	912,443	361,191	66	134	.66
1968	18,312	271	1,054,776	409,905	68	136	.61
1969	19,033	275	1,129,188	441,089	69	140	.61
1970	19,598	299	1,303,975	501,528	66	153	.60

$$\text{*Equivalent Barrels} = \frac{\text{Total industry production value}}{\text{Weighted average price per barrel of oil}}$$

VII PUBLICATIONS AND ADDRESSES

The Board makes available to industry and the general public a wide variety of publications and maps. The pricing policy is based on the principle that those costs associated with a publication which are over and above normal operating costs must be met by revenue generated from its sale.

In 1970 the following special reports resulted from major public hearings:

OGCB 70-A	In the Matter of an Application of Alberta and Southern Gas Co. Ltd. under The Gas Resources Preservation Act, 1956.
OGCB 70-B	In the Matter of an Application of Trans-Canada Pipe Lines Limited under The Gas Resources Preservation Act, 1956.
OGCB 70-C	In the Matter of an Application for Reconsideration of a Permit Authorizing the Removal of Propane from the Province of Dome Petroleum Limited and TransCanada GasProducts Ltd. under The Gas Resources Preservation Act, 1956.

Addresses and Technical Papers

The following addresses, lectures or technical papers were presented by members of the Board and its staff in 1970:

Speaker	Title of Address
G. W. Govier	"Alberta's Synthetic Crude Oil Development" Stanford Research Institute January 1, 1970
G. W. Govier	"Economic Conservation and Proration" Board Reservoir Engineering Fundamentals Course January 1, 1970
G. W. Govier	"Alberta's Synthetic Crude Oil Development Policy", AIME in Denver, Colorado, U.S.A. February 18, 1970

Speaker	Title of Address
G. W. Govier	"Conservation & Pollution Control in Oil & Gas Industry" Red Deer Rotary Club June 1, 1970
M. Gibson	"Board Regulations Governing Servicing and Completion Operations" Twenty Service Rig Personnel September 22, 1970
Vern Jones and A. Casey	"History of the Board" 17 Service Rig Personnel and 27 Oil Company Personnel, Lease Operators Course, Edmonton September 29, 1970
Vern Jones	"Liquid and Gas Measurement" Lease Operators Course, Edmonton October 22, 1970
R. J. Switzer	"Deep Well Rigs - Farm Water Wells" Sponsored by Department of Agriculture, Medicine Hat Branch Irvine and District Farmers and Schuler and District Farmers
R. J. Switzer	"Government Regulations (Field Handling of Natural Gas) - Short Course" S.A.I.T., Calgary PITS sponsored, Field Personnel, Operators, Technicians, etc.
D. R. Shaw	"Pollution by Oil and How to Overcome It" Buyer Group of CPA November 19, 1970
G. J. DeSorcy	"Role of the Board in the Oil and Gas Industry" University of Alberta, Economics Class March 3, 1970
G. J. DeSorcy	"The Board's New Pollution Control Responsibilities" Alberta Sulphur Research Symposium in Calgary October 2, 1970
G. J. DeSorcy	"Pollution Control in the Oil and Gas Industry" University of Alberta October 14, 1970

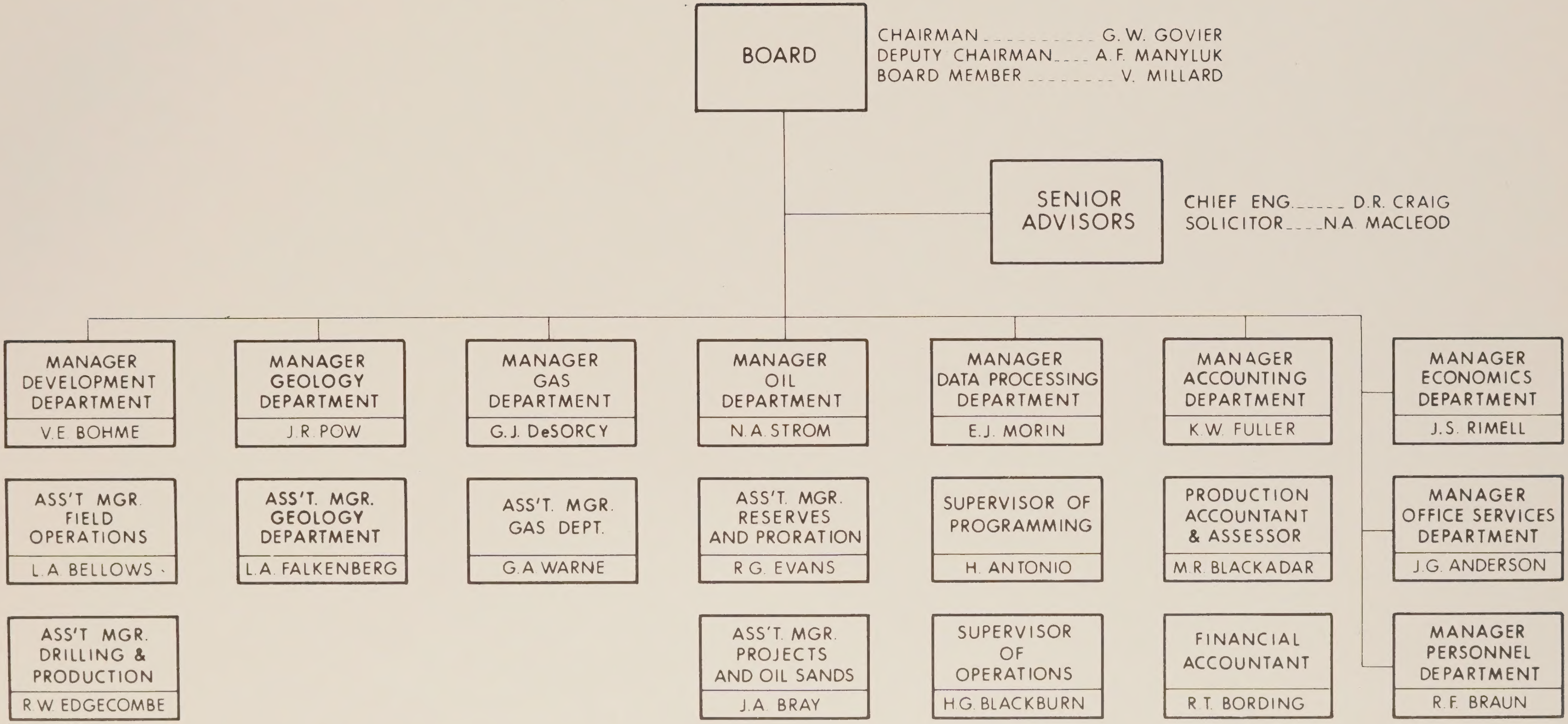
Speaker	Title of Address
J. R. Pow	"Fundamentals of Seismic Interpretation" S.A.I.T. Petroleum Technology Students February, 1970
N. A. Strom	"Alberta Synthetic Crude Oil Development Policy" Annual A.I.Ch.E. Students, Banff May, 1970
N. A. Strom	"Alberta Proration - Past, Present, Future" PITS Unitization School, Banff November, 1970
M. J. Stowko	"Production Spacing Units, Blocks and Projects" S.A.I.T. Petroleum Technology Students May, 1970
N. G. Berndtsson	"Use of Reserves Estimates and How They are Obtained" S.A.I.T. Petroleum Technology Students May, 1970

Author	Title of Technical Paper
G. C. Watkins and Karen Sharp	"The Long-Term Cost of Alberta Conventional Crude Oil" The Journal of Canadian Petroleum Technology Volume 9, No. 1 January-March, 1970

OIL AND GAS CONSERVATION BOARD

BOARD ORGANIZATION

AT DECEMBER 31, 1970


BOARD
CHAIRMAN ---------- G. W. GOVIER
DEPUTY CHAIRMAN ---- A.F. MANYLUK
BOARD MEMBER -------- V. MILLARD
SENIOR ADVISORS
CHIEF ENG. ----- D.R. CRAIG
SOLICITOR ---- N.A. MACLEOD
MANAGER DEVELOPMENT DEPARTMENT
V.E. BOHME
ASS'T MGR. FIELD OPERATIONS
L.A. BELLOWS
ASS'T MGR. DRILLING & PRODUCTION
R.W. EDGECOMBE
MANAGER GEOLOGY DEPARTMENT
J.R. POW
ASS'T. MGR. GEOLOGY DEPARTMENT
L.A. FALKENBERG
MANAGER GAS DEPARTMENT
G.J. DeSORCY
ASS'T. MGR. GAS DEPT.
G.A. WARNE
MANAGER OIL DEPARTMENT
N.A. STROM
ASS'T. MGR. RESERVES AND PRORATION
R.G. EVANS
ASS'T. MGR. PROJECTS AND OIL SANDS
J.A. BRAY
MANAGER DATA PROCESSING DEPARTMENT
E.J. MORIN
SUPERVISOR OF PROGRAMMING
H. ANTONIO
SUPERVISOR OF OPERATIONS
H.G. BLACKBURN
MANAGER ACCOUNTING DEPARTMENT
K.W. FULLER
PRODUCTION ACCOUNTANT & ASSESSOR
M.R. BLACKADAR
FINANCIAL ACCOUNTANT
R.T. BORDING
MANAGER ECONOMICS DEPARTMENT
J.S. RIMELL
MANAGER OFFICE SERVICES DEPARTMENT
J.G. ANDERSON
MANAGER PERSONNEL DEPARTMENT
R.F. BRAUN